Volume 319, number 3, 282–291 FEBS 12235 March 1993

Book Reviews

Protein Structure: New approaches to disease and therapy; by Max Perutz, Freeman; New York, 1992; xiv + 326 pages. £32.95 (hardback), £21.95 (paperback). ISBN 0-7167-7021-0/0-7167-7022-9.

This book will impress the reader from so many points of view that it is difficult to know where to start with a description, so I shall begin with a political angle.

Max Perutz clearly shows what an enormous contribution basic molecular and cellular biophysics has made, and will continue to make, to medicine. He has done so in a language which should enable every intelligent person to appreciate the principles, if not the scientific detail, of the subject and its implications. I was an eye (and ear) witness, in the late '40s, when everybody laughed at Max for wasting his time on the impossible and useless task of attempting protein structure analysis by X-ray crystallography. Fortunately it was only almost everybody: Bragg, Himsworth, as well as Dorothy Hodgkin and Bernal, encouraged him, and John Kendrew joined him; I am ashamed to say I lacked the courage to accept the offer to participate in this venture. All politicians should read the book to get the message, even cabinet ministers might understand it. I am sending this review to my MP, who happens to be William Waldegrave. Having just read about the preposterous idea of privatizing the MRC institutes – jewels in the crown of British science – I despair of our masters in Whitehall; will they never appreciate what basic science can do for our welfare and wealth! Private enterprise will never invest in a thirty year project.

The volume contains eleven short chapters as well as appendices on mathematical principles of structure analysis and on principles of protein structure. An introduction on diffraction without tears will be welcome by many readers, but those who are put off by even such gentle physics should be assured that they can follow the rest of the book without it. Nearly half the rest of the volume is taken up with discussions on protein recognition of other proteins, of drugs and of nucleic acids. These topics are lucidly explained in structural terms. The design of drugs has been put on a rational basis by such information. Two chapters are taken up with, what might be called, gene technology, namely possible remedies for genetically impaired protein function and the in vitro production of modified proteins. Other topics reviewed are virus structure, cytokinases, cell growth and differentiation. Two summary chapters highlight the benefits to medicine, past and future.

The present reviewer is the last person to underestimate the contributions of chemistry and kinetics to this field. Mechanisms have to be studied in the medium in which they operate, that is in solution. However, the resolution of protein structures turned out to be the missing link which joined all other contributions to protein science together. The last few years have brought structure analysis and kinetics together. In a recent Discussion at the Royal Society (January 1992) it was shown how several rapid reaction techniques can now be combined with time resolved X-ray crystallography. The results of structure determinations made possible spectacular predictions about causes of biological malfunctions and possible remedies. But that is only the beginning. Perutz concentrates on an illuminating discussion of the implications of such studies to our understanding of diseases. Every issue of Nature or Science enlightens us about vital structural information on yet another important protein. Plant science, and thus food production, will also be revolutionized by our knowledge of the structures of nitrogenase (Nature, Dec 10th), the photosynthetic reaction centre and the CO_2 fixing enzyme ribulose bisphosphate carboxylase.

In spite of the fact that the author's principal contributions have been through the application of structure analysis by X-ray crystallography, every topic is lucidly introduced and put into context, by a discussion of the relevant biology. Max Perutz has not only been an integral part of the history of molecular biology in general and protein structure in particular, he is still in the midst of it all. Clearly he knows, from day to day, what is happening in the field in various parts of the world. He is now sharing this vast accumulation of experience with every student active in the biological sciences. We should be grateful to him.

I trust that nobody will expect this highly original monograph to be all embracing. The volume under review is not a reference book, the subject is now expanding too fast. However, the publishers could well afford to invest in a more professional index. After all, this will be and deserves to be, a best seller. In the hope that students will buy the book I protest about the price for the paperback edition; this comment does not imply any disrespect for the value of the book.

H. Gutfreund

Information about books for review in FEBS Letters, but **not the books** themselves unless requested by the Book Reviews Editor, should be sent to: Professor H.R.V. Arnstein, FEBS Letters Book Reviews Editor, 15 Hurst Avenue, Highgate, London N6 5TX, UK.